CALIFORNIA DIVISION OF MINES AND GEOLOGY

Fault Evaluation Report FER-79

November 14, 1978

1. Name of fault

The McInnes fault.

2. Location of fault

Vicinity of the town of Beaumont, Beaumont quadrangle, Riverside County, California.

3. Reason for evaluation

An environmental impact study (1978) by the California Department of Transportation, for a proposed grade separation in Beaumont, identified an "active" fault trace. This locality also lies within the 1978 study area of the 10-year program for fault evaluation.

4. List of references

Bloyd, R.M., Jr., 1971, Underground storage of imported water in the San Gorgonio Pass area, southern California: U.S. Geological Survey Water-Supply Paper 1999-D, 37 p.

Dibblee, T.W., Jr., 1964, Geologic map of the Banning 15-minute quadrangle, Riverside County, California: U.S. Geological Survey Open File Map.

(Located in Santa Ana sheet file, Map Room, Ferry Building.)

Huber, O.L., 1978, Environmental geology in the vicinity of a proposed SPRR grade separation on Route 79 in the City of Beaumont in Riverside County. Unpublished report by the State of California,

Department of Transportation, 11 p.

(A-P no. C-287.)

Jennings, C.W., 1975, Fault map of California with locations of volcanoes, thermal springs and thermal wells: California Division of Mines and Geology, California Geologic Data Map Series, Map no. 1. Scale 1:750,000.

Real, C.R., Parke, D.L., and Toppozada, T.R., 1977, Magnetic tape catalog of California earthquakes, 1900-1974: California Division of Mines and Geology.

Stephens, E.E., 1978, Subsurface exploration (geophysical and trenching) in the vicinity of the proposed Beaumont Avenue railroad grade separation. Unpublished report by the State of California, Department of Transportation, 10 p.

(A-P no. C-289.)

Aerial photography

Designation: Fairchild C-1940

Date: 1932

Type: Black and white, vertical stereo.

Scale: 1" = 1200'

Coverage: Beaumont area and southwestward to the San Jacinto fault.

Availability: Fairchild aerial photography collection, Geology Department, Whittier College, Whittier, California.

Designation: Fairchild C-14312

Date: 1949

Type: Black and white, vertical stereo.

Scale: 1" = 400'

Coverage: Beaumont area and San Gorgonio Pass area.

Availability: Fairchild aerial photography collection, Geology Department, Whittier College, Whittier, California.

5. Summary of available data

The McInnes fault was mapped as an unnamed fault by Dibblee (1964) (figure 3 of this FER). He shows the fault extending southeastward from Beaumont into the northernmost hills of the San Jacinto Mountains. The map of Bloyd (1971, plate 1) shows an unnamed fault that appears to be the same as that mapped by Dibblee (1964). About 1 km to the southwest, Bloyd shows another, parallel, fault which he calls the "McInnes fault." Bloyd does not state, on his map or in his text, what the evidence is, or what his source is for mapping these faults. Inspection of his maps does not indicate that these faults form ground-water barriers or that they form the boundaries of any ground-water basins.

Huber (1978) and Stephens (1978) conducted complementary studies of the site of a proposed grade separation in Beaumont. Huber (1978, exhibit D) shows the same two northwest-trending fault traces as shown by Bloyd (1971). Huber labels the more northeasterly of the two faults the "McInnes fault." He cites an unpublished geologic map by the Metropolitan Water District (1936) as the source for these two faults. His bibliography gives no title for that map. Stephens (1978) conducted

a detailed resistivity, seismic, and trench study of the fault. The fault zone was clearly identified in the trenches.

The McInnes fault (see figure 3), in the vicinity of Beaumont, strikes approximately N 55° W. All additional information about the fault is contained in the report by Stephens (1978). He observed the fault in 8 of 9 trenches (see figure 4 for the trench locations). The observed "fractures" had trends ranging from N 11°W to N 30°W, and were vertical or dipped very steeply to the northeast. He also observed differences in the color of the alluvium on opposite sides of the fault. "Unconsolidated alluvium" is the only material that was observed in the trenches. The "fractures" were observed, in some cases, to extend nearly to the surface. Stephens also observed an "open" condition along some of the shear planes. He attributes this condition to recent movement along "tension fractures." It is mainly on the basis of this observation that he makes the statement: "It seems probable that this fault is active."

Huber (1978, p. 2) assigns a Pleistocene age to the alluvium that is faulted, but says that "... the age has not been accurately determined."

The seismicity maps (figures 2a and 2b) show this region to be seismically very active. The general density of events is high, and in distribution they are scattered all over the place (even on the "A" quality map with a $\pm$ 2.5 km accuracy). Both maps show epicenters near the McInnes fault, but in general the seismicity there is no greater than it is for the region as a whole.

6. Interpretation of aerial photography:

I obtained two sets of aerial photo coverage of the McInnes fault. The older set, Fairchild C-1940 (1932, frames D16 to D18, and D32 to D33), covers only the northwesternmost one kilometer of the fault, but includes the area of the proposed grade separation. The newer set, Fairchild C-14312 (1949, frames 1-39 to 1-43, 1-64 to 1-69, and 1-150 to 1-154), is large scale (1 inch = 400 feet)and covers all of the fault except the southeasternmost part which extends into the basement terrane of the northern San Jacinto Mountains.

I observed no evidence on the photos, either topographic or tonal, for any of the faults shown on figure 3.

I observed that the alluvium in this area has undergone erosional dissection, and that the erosional modification of this terrace has by now advanced to a rather mature stage of low, gently sloping hills. I make two interpretations from this observation: (1) the alluvium is much older than Holocene; the geomorphic maturity I observe could not have occurred in 11,000 years or less, and (2) it is unlikely that significant surface offset, either horizontal or vertical, has occurred along the fault during Holocene time; the gentle topography indicates a slow erosional rate at present and during at least the past several thousand years -- too slow to have totally obliterated all topographic features that would have been formed if there had been significant offset during Holocene time.

8. Conclusions:

I conclude that the McInnes fault does exist, substantially at the position where it has been mapped, but that the movement along the

fault has either occurred before Holocene time, or the rate of movement has been so slow as to have been incapable of generating geomorphic features that could survive the relatively slow rate of erosional modification of that area. I am unable to adequately account for the disturbing disparity between the obvious lack of evidence for recent fault activity as seen on the aerial photos and the cogent argument for recent activity given by Stephens (1978) based on his observation of "open" fractures. Based on my many years of photo-interpretation experience, it is my opinion that the aerial photo evidence is relatively more reliable in this case; I must suspect that the "open" fractures are of some non-tectonic origin. The seismicity in this area does not appear to be specifically related to the McInnes fault.

9. Recommendations:

I recommend no further study of this fault. I recommend that no Special Studies Zone be established along the fault.

10. Investigating geologist's name, date:

Drew P. Smith

DREW P. SMITH
Geologist
San Francisco District Office
November 14, 1978

I agree with recommendations.
EHH
12/1/78

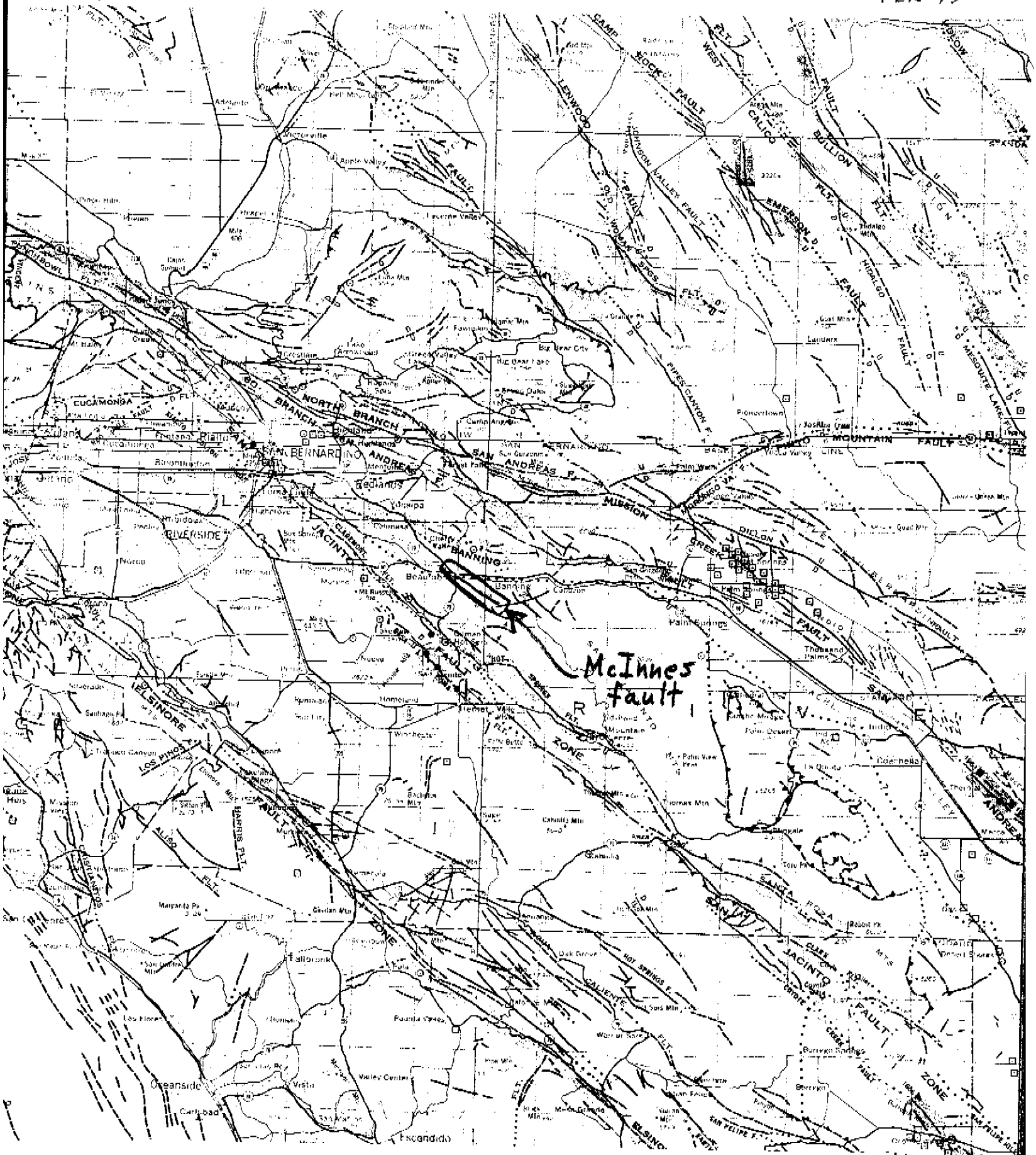

Figure 1. Index map showing location of the McInnes fault. Map is modifled from Jennings (1975).

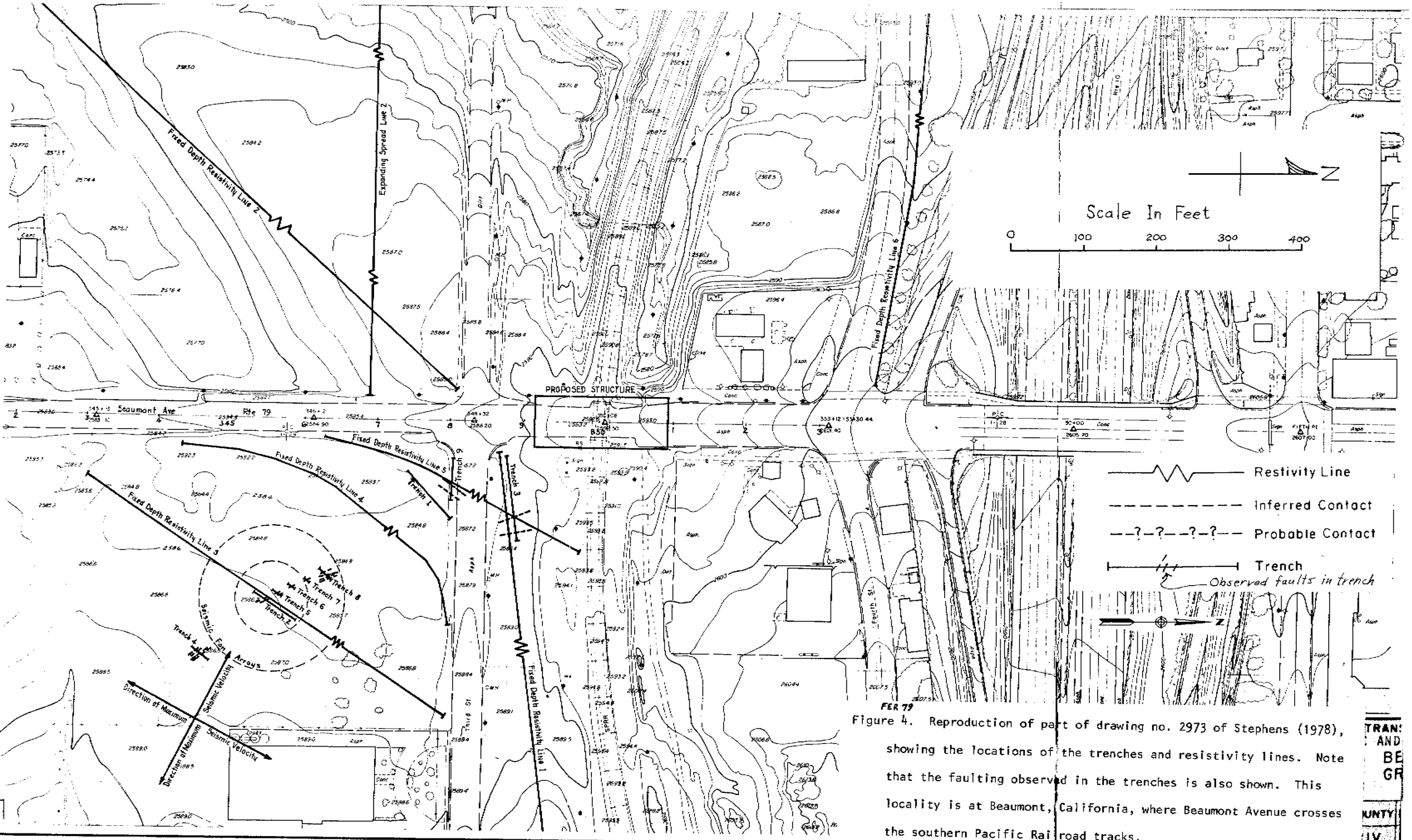

Figure 4. Reproduction of part of drawing no. 2973 of Stephens (1978), showing the locations of the trenches and resistivity lines. Note that the faulting observed in the trenches is also shown. This locality is at Beaumont, California, where Beaumont Avenue crosses the southern Pacific Railroad tracks.